









DESBARATS
DRINKING WATER SYSTEM
WATERWORKS # 210001870

ANNUAL & SUMMARY
REPORTS 2021

Introduction

This Annual and Summary Report has been prepared in accordance with both Schedule 22 and section 11 of Ontario Regulation 170/03. In this manner, the requirements by regulation for each report have been consolidated into a single document. This Report is intended to brief the ownership and consumers of the Desbarats Drinking Water System on the system's performance over the past calendar year January 1 to December 31, 2021.

This report encompasses all elements as required by O. Reg. 170/03. Each section explains what is required for the category Small Municipal Residential DWS (as it pertains to the Desbarats DWS) and how limits were met or if shortfalls were revealed. The last section contains a list of tables and definition of terms identified in this report.

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System Description

The Desbarats water treatment plant is rated as a Class 2 Water Treatment subsystem, and for the purposes of O. Reg. 170/03 it is categorized as a Small Municipal Residential system.

The treatment plant includes two (2) low lift centrifugal pumps, each pump rated at 4.24 L/s that deliver surface water from Lake Huron.

The treatment system includes an Ecodyne Monoplant complete with mechanical flocculation, sedimentation and dual media filtration compartments. The filter portion of the package plant involves a dual media of sand and anthracite and provides for filtering to waste after backwashing. Waste from the clarifier is drained at timed intervals to backwash settling tanks from which supernatant travels by gravity to a diffuser in Lake Huron, located downstream from the intake site.

Post chlorination using sodium hypochlorite is injected after filtration before the clearwell to achieve primary and secondary chlorination. There are three (3) cells to the clearwell (reservoir) with a total storage capacity of 142 cubic meters. There is standby power for continued pumping capacity and plant operations. The system also involves six (6) pre-charged pressure tanks for distribution pressure control.

- There are approximately 276 residents using the system with 110 service connections (93 private residences) and a secondary school with a population of about 600 students. Water is provided to the distribution system through a submarine transmission main

Chemicals

Chemicals utilized at the Desbarats Treatment plant during 2021 include:

- Sodium Hypochlorite for primary and secondary disinfection
- Aluminum Sulphate for coagulation
- Polymer (LT20) as a coagulant aid
- Soda Ash for pH and alkalinity adjustment

2021 Expenditures

During the year of 2021, expenses were incurred to maintain treatment and distribution functions:

- ESA services
- 12-month surveillance audit (SAI Global)
- Floc motor repairs
- Chemical pump flow monitor and repair kits
- PRV for high lift header

2021 Drinking Water System Changes

- Form 1 – Record of Watermains Authorized as a Future Alteration
 - n/a
- Form 2 – Record of Minor Modification or Replacements
 - Pressure relief valve on high lift pump header
- Form 3 – Record of addition, modification or replacement of equipment discharging a contaminant of concern to the atmosphere
 - n/a

Water Quality

Microbiological Sampling and Testing

Sampling is conducted weekly for the DWS at the frequencies and locations identified by Schedule 11 of O. Reg 170/03 for Small Municipal Residential Systems.

Table 1: Microbiological sampling requirements

Location	Sample Analysis	# samples	Frequency
Raw	EC / TC	1 sample	monthly
Treated	N/A	-	-
Distribution	EC / TC/HPC	1 sample	bi-weekly

Desbarats' raw samples are collected from a sample tap from the raw water header. Treated samples are collected from a sample tap from the treated discharge header prior to distribution. Distribution samples are rotated weekly at the following locations representing areas throughout the hamlet: Township Office, Baptist Church, Arena, and Central Algoma Secondary School. Other locations may be sampled as required.

Table 1a: Microbiological Sample Results

Type	# samples	EC (range)	TC (range)	# samples	HPC (range)
Raw	17	0 - 2	0 - 70	-	-
Distribution	54	0	0	31	0 - 10

Operational Checks and Testing

Operational testing is completed as per Schedules 6 & 7 of O. Reg. 170/03 for Small Municipal Residential Systems. These checks and testing are completed on site at the water treatment facility by licensed operators. Continuous monitoring analyzers (collecting 5 minute readings) are utilized for measurement of filter turbidity and chlorine residuals.

Table 2: Monthly Filter Turbidity Results

Month	Avg turbidity (NTU)	Range (NTU)	Monthly Filter Efficiency
January	0.05	0.03 - 0.21	100
February	0.04	0.03 - 0.11	100
March	0.05	0.03 - 0.15	100
April	0.07	0.04 - 0.50	99.97
May	0.05	0.04 - 0.11	100
June	0.05	0.03 - 0.17	100
July	0.04	0.03 - 0.09	100
August	0.04	0.03 - 0.11	100
September	0.05	0.03 - 0.14	100
October	0.04	0.03 - 0.15	100
November	0.05	0.03 - 0.23	100
December	0.08	0.04 - 0.21	100

Filter Efficiency is monitored by tracking the turbidity readings above and below 0.30 NTU during filter run time. Desbarats maintained filter compliance each month above 95%, the required limit for dual media filtration to achieve necessary filtration credits for primary disinfection.

Table 3: Chlorine Residuals

Month	Average Chlorine Residual (mg/L)	Chlorine Residual Range (mg/L)
January	1.58	1.28 - 2.09
February	1.52	1.23 - 2.49
March	1.45	1.14 - 2.50
April	1.47	1.08 - 2.65
May	1.44	0.98 - 2.10
June	1.47	0.97 - 1.97
July	1.61	1.02 - 1.95
August	1.50	0.92 - 2.08
September	1.45	0.81 - 2.51
October	1.45	0.88 - 1.99
November	1.61	1.18 - 2.52
December	1.50	0.92 - 1.97

Chlorine residuals are continuously-monitored and data is recorded on 5 minute intervals.

Chemical Sampling and Testing

Schedule 13 of O. Reg. 170/03 outlines chemical sampling requirements for Small Municipal Residential systems. Schedules 23 (inorganics) and 24 (organics) are collected every 60 months as well as sodium and fluoride. This system requires quarterly sampling for Nitrites/Nitrates and THM’s. Schedule 15.1 outlines the requirements for semi-annual lead testing (2 periods per year). Desbarats’ lead sampling follows the reduced sampling requirements every third year.

Table 4: Schedule 23 - Inorganics

Parameter	Sample Date	Result (µg/L)	Units	ODWS
Antimony	8-Jan-18	<0.60	µg/L	6
Arsenic	8-Jan-18	<1.0	µg/L	25
Barium	8-Jan-18	<10	µg/L	1000
Boron	8-Jan-18	<50	µg/L	5000
Cadmium	8-Jan-18	<0.10	µg/L	5
Chromium	8-Jan-18	<1.0	µg/L	50
Fluoride	8-Jan-18	<0.020	mg/L	1.5
Mercury	8-Jan-18	<0.10	µg/L	1
Selenium	8-Jan-18	<1.0	µg/L	10
Sodium	8-Jan-18	5.05	mg/L	20
Uranium	8-Jan-18	<2.0	µg/L	20

All results for inorganic parameters are within the maximum acceptable concentrations (MAC) of the Ontario Drinking Water Quality Standards as defined in O. Reg. 169/03. No result is above the half MAC with the exception of sodium which has an aesthetic objective (AO) of 200 mg/L, but has a limit of 20 mg/L for medical reasons and would require notifications if exceeded.

Table 5: Nitrite/ Nitrate Results

Date	ODWS	04-Jan-21	12-Apr-21	05-Jul-21	18-Oct-21
Unit	mg/L	mg/L	mg/L	mg/L	mg/L
Nitrate	1.0	0.27	<0.05	0.30	0.28
Nitrite	10	<0.05	<0.05	<0.05	<0.05

All quarterly results for Nitrites and Nitrates are well below ODWS.

Table 5a: THM/HAA Results

Date	ODWS	Q1	Q2	Q3	Q4	RAA
Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
THM	100	6.7	6.8	24	14.9	13.1
HAA	80	8	11	17	16	12.9

Table 6: Schedule 24 - Organics

Parameter	Date	Result	Unit	ODWS
Aalachlor	8-Jan-18	<0.10	µg/L	5
Atrazine + N-dealkylated metabolites	8-Jan-18	<0.20	µg/L	5
Azinphos-methyl	8-Jan-18	<0.10	µg/L	20
Benzene	8-Jan-18	<0.50	µg/L	5
Benzo(a)pyrene	8-Jan-18	<0.010	µg/L	0.01
Bromoxynil	8-Jan-18	<0.20	µg/L	5
Carbaryl	8-Jan-18	<0.20	µg/L	90
Carbofuran	8-Jan-18	<0.20	µg/L	90
Carbon Tetrachloride	8-Jan-18	<0.20	µg/L	5
Chlorpyrifos	8-Jan-18	<0.10	µg/L	90
Diazinon	8-Jan-18	<0.10	µg/L	20
Dicamba	8-Jan-18	<0.20	µg/L	120
1,2-Dichlorobenzene	8-Jan-18	<0.50	µg/L	200
1,4-Dichlorobenzene	8-Jan-18	<0.50	µg/L	5
1,2-Dichloroethane	8-Jan-18	<0.50	µg/L	5
1,1-Dichloroethylene (vinylidene chloride)	8-Jan-18	<0.50	µg/L	14
Dichloromethane	8-Jan-18	<5.0	µg/L	50
2-4 Dichlorophenol	8-Jan-18	<0.30	µg/L	900
2,4-Dichlorophenoxy acetic acid	8-Jan-18	<0.20	µg/L	100
Diclofop-methyl	8-Jan-18	<0.20	µg/L	9
Dimethoate	8-Jan-18	<0.10	µg/L	20
Diquat	8-Jan-18	<1.0	µg/L	70

Parameter	Date	Result	Unit	ODWS
Diuron	8-Jan-18	<1.0	µg/L	150
Glyphosate	8-Jan-18	<5.0	µg/L	280
Malathion	8-Jan-18	<0.10	µg/L	190
2-Methyl-4-Chlorophenoxyacetic Acid (MCPA)	8-Jan-18	<0.20	µg/L	100
Metolachlor	8-Jan-18	<0.10	µg/L	50
Metribuzin	8-Jan-18	<0.10	µg/L	80
Monochlorobenzene	8-Jan-18	<0.50	µg/L	80
Paraquat	8-Jan-18	<1.0	µg/L	10
Pentachlorophenol	8-Jan-18	<0.50	µg/L	60
Phorate	8-Jan-18	<0.10	µg/L	2
Picloram	8-Jan-18	<0.20	µg/L	190
Polychlorinated Byphenols (PCB)	8-Jan-18	<0.035	µg/L	3
Prometryne	8-Jan-18	<0.10	µg/L	1
Simazine	8-Jan-18	<0.10	µg/L	10
Terbufos	8-Jan-18	<0.20	µg/L	1
Tetrachloroethylene	8-Jan-18	<0.50	µg/L	30
2,3,4,6-Tetrachlorophenol	8-Jan-18	<0.50	µg/L	100
Triallate	8-Jan-18	<0.10	µg/L	230
Trichloroethylene	8-Jan-18	<0.50	µg/L	5
2,4,6-Trichlorophenol	8-Jan-18	<0.50	µg/L	5
Trifluralin	8-Jan-18	<0.10	µg/L	45
Vinyl Chloride	8-Jan-18	<0.20	µg/L	2

All results for the required organic sampling of schedule 24 are below the MAC.

Lead Sampling: The maximum acceptable concentration for lead in drinking water is 10µg/L. This applies to water at the point of consumption since lead is only present as a result of corrosion of lead solder, lead containing brass fittings or lead pipes which are found close to or in domestic plumbing and the service connection to buildings.

Table 7: Community Lead Sampling Results

Location Type	Lead results, ug/L	Alkalinity, mg/L	pH
Distribution-Winter	<0.1	40	7.2
Distribution-Summer	0.2	42	7.3

Based on historical results Desbarats drinking water system is exempt for the plumbing lead sampling program, however monitoring of distribution alkalinity and pH every winter and summer collection periods and Lead every 3 years is required.

Table 8: TSS – C of A requirement for plant process waste water

Month	Result Value	Unit
Quarter 1 Avg	13.3	mg/L
Quarter 2 Avg	13.3	mg/L
Quarter 3 Avg	15.3	mg/L
Quarter 4 Avg	13.3	mg/L

The 2021 annual average suspended solids concentration is 14 mg/L for plant service water (BW, instrumentation flows) released back to the environment, and is under the C of A limit of 25 mg/L.

Compliance

Adverse Water Quality Incidents

During 2021, the Desbarats DWS reported three incidents of adverse water quality.

Table 9: Adverse Water Quality Incidents

Date	Incident Reported
July 26	Loss of distribution pressure – planned valve replacement at WTP
Aug 6	Loss of distribution pressure – valve replacement in distribution system
Sept 13	Loss of distribution pressure – transmission line repair at WTP

Annual Drinking Water System Inspection

The annual DWS inspection took place on October 19, 2021 by MECP Drinking Water inspector Stephanie Robbins. Zero non-compliance and zero best practice recommendations were identified.

Flows

The Permit to Take Water authorizes the municipality to draw water from Lake Huron at a rate not to exceed 547.2 m³/d. The maximum daily volume taken was 264 m³ /d, 48 % of the permit limit.

Municipal Drinking Water Licence: 275-201 specifies a maximum intake capacity of 366 m³/d. The max flow rate reported was 221m³/d, 60.4% of the rated capacity.

The Desbarats WTP treated and distributed a total of 39,766 m³ during the year of 2021. The average day treated flow demand was 108.9 m³/d, and maximum day flow was 221 m³/d on September 12, 2021.

Chart 1: 5 year Flow Comparison

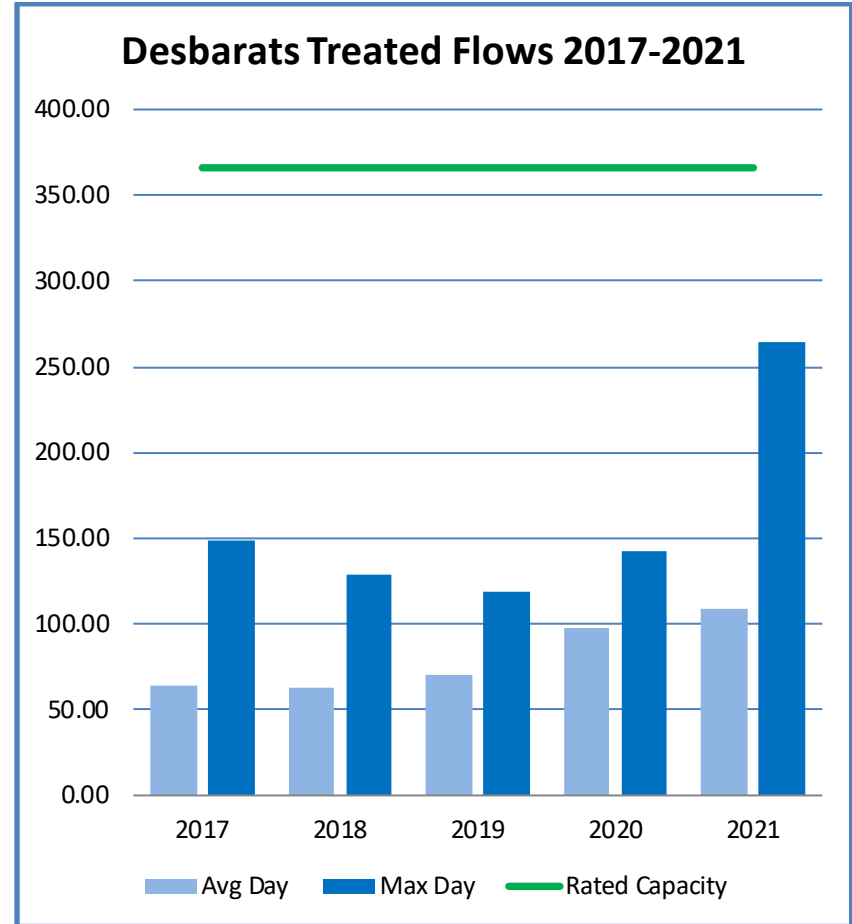
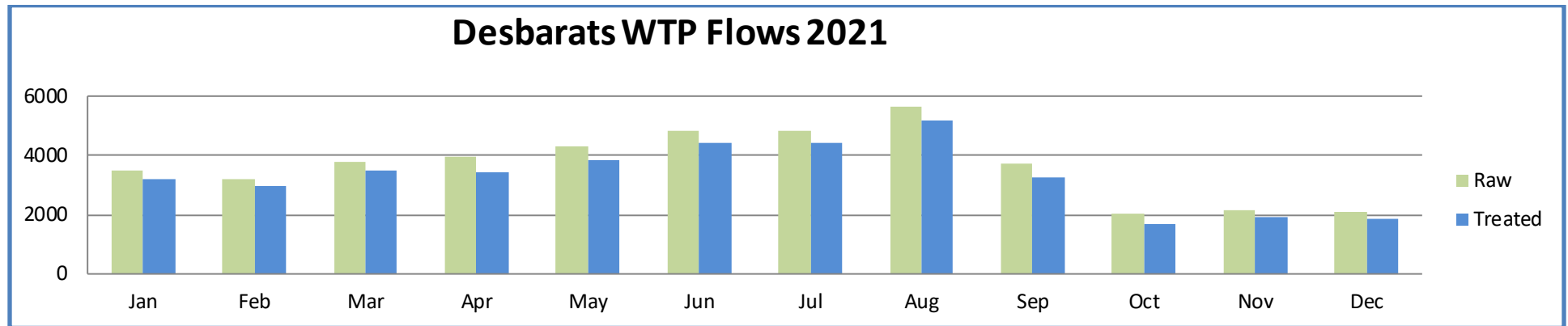


Table 10: Raw and Treated water Flows 2021

2021	Raw Water Flows					Treated Water Flows			
Month	Raw Water (m ³)	Minimum Day (m ³ /d)	Maximum Day (m ³ /d)	Average Day (m ³ /d)	% Max. Flow Day of PTTW	Treated Water (m ³)	Minimum Day (m ³ /d)	Maximum Day (m ³ /d)	Average Day (m ³ /d)
January	3,491	100	121	112.6	22.1	3,223	93	119	104.0
February	3,223	105	133	115.1	24.3	2,987	97	123	106.7
March	3,754	105	149	121.1	27.2	3,475	102	140	112.1
April	3,937	113	162	131.2	29.6	3,413	105	128	113.8
May	4,285	114	162	138.2	29.6	3,862	107	150	124.6
June	4,846	142	202	161.5	40.2	4,404	131	181	146.8
July	4,855	145	168	156.6	30.7	4,432	130	158	143
August	5,631	159	196	181.6	36.0	5,164	143	182	166.6
September	3,751	40	264	125.0	48.2	3,234	41	221	107.8
October	2,041	38	97	65.8	17.7	1,655	34	89	58.3
November	2,142	54	85	71.4	15.5	1,891	52	76	63.0
December	2,119	53	85	68.4	15.5	1,873	51	71	60.4

Chart 2: Desbarats WTP Flows 2021



Report Availability

Report Availability

Section 11 of O. Reg. 170/03 defines that this Annual Report must be given, without charge, to every person who requests a copy. Effective steps must also be taken to advise users of water from the system that copies of the report are available, without charge, and of how a copy may be obtained. This Annual Report shall be made available for inspection by the public on the Town Office.

Township of Johnson
1 Johnson Drive
Desbarats, ON
POR 1E0

Summary Report

This Summary report for the Desbarats Drinking Water System for the period of January 1st to December 31st, 2021 has been prepared in accordance to Schedule 22 of O. Reg. 170/03.

Tables, Definition of Terms

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Acronym	Definition
AWQI	Adverse water quality incident
BWA	Boil Water Advisory
DM	Dual Media
DWS	Drinking water system
EC	E. Coli
HAA	Haloacetic acids
HPC	Heterotrophic plate count
MAC	Maximum Acceptable Concentration
m³	Cubic metres
m³/d	Cubic metres per day
mg/L	Milligram per litre (part per million)
ML	Megalitre (1000 m ³)
NTU	Nephelometric turbidity unit
ODWS	Ontario Drinking Water Standards
O. Reg. 170/03	Ontario Regulation 170/03
PTTW	Permit to take water
SCADA	Supervisory control and data acquisition
TC	Total coliforms
THM	Trihalomethane
µg/L	Microgram per litre (part per billion)
WD	Water distribution
WT	Water treatment
WTP	Water treatment plant